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OCCURRENCE OF *PHAEOCYSTIS* IN MANGROVE CREEKS NEAR KARACHI

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Phaeocystis is a prymnesiophycean flagellate which occurs preferably in cooler regions of the world and there are many accounts of its occurrence, life history, culture and seasonal abundance (Savago, 1930; Kornmann, 1955; Kayser, 1970; Grimm and Weissee, 1985; Veldhius *et al.* 1986; Eberlein *et al.* 1985; Lancelot *et al.*, 1987; Jahnke and Baumann, 1987; Rick and Aletsee, 1989; Jahnke, 1989). On the other hand, information from warmer regions is extremely scarce (Guillard and Hellebust, 1971; Atkinson *et al.*, 1978; Al-Hassan *et al.*, 1990). The present paper is a first report of its occurrence from the warmer area of north east Arabian Sea.

The area of study sites is shown in figure 1. It is basically a system of narrow and shallow anastomosing creeks surrounding small islets densely populated with the mangrove *Avicennia marina* (Snedaker, 1984). They lie on the southern limits of the cosmopolitan city Karachi, Pakistan, bordering the north-east Arabian Sea. These are polluted by Malir River and also emanations from nearby steel mill, Port Qasim and a cattle farm. Five minute horizontal hauls (mesh size 40 µm) were used to collect the samples alongwith plastic bucket samples from the surface. The latter sampling was employed to estimate the abundance of *Phaeocystis* balls and the former for identification of other phytoplankton taxa present in the area. The balls were so delicate that they could not tolerate screening through the mesh of the net and eventually ruptured. Samples were brought to the laboratory alive and fixed in Lugol's fixative (Saraceni and Riggiu, 1974) and studied under a Light microscope. Simultaneous readings on temperature and salinity were also measured by a thermometer and a refractometer, respectively.

Phaeocystis balls were observed floating in four study sites namely Gharo Creek, Chara Creek, off Rehri and Koranig Creek (Fig.1) on 30th September, 3rd, 8th & 14th October, 1991 respectively, a period included in the transitional period between SW and NE monsoon seasons. Temperature and salinity values were recorded during the period of collection (Table 1). The balls were of varying sizes ranging between 5 to 10 mm and as such were visible to the naked eye during collection. They were single spheres (Drebes, 1974; Jahnke and Baumann, 1987; Sournia, 1988; Rick and Aletsee, 1989), and not lobed (Kornmann, 1955). They appeared light brown in colour and were so delicate that they ruptured or shrank (Fig.2) on slight contact with any object. They were not observed forming blooms and their density was as low as 3-4 balls per litre.

The alga was found only as spherical palmelloid colonies (Fig.2) free floating in the water and no motile unicellular stage was recorded. The cells were spherical in shape, 4-8 µm large (Fig.3) and possessed 2-3 chromatophores (Sournia, 1988). They were not arranged in groups, but uniformly distributed in the colony. The present specimens, therefore, very closely resemble *P. globosa* on the basis of shape and size of the colony

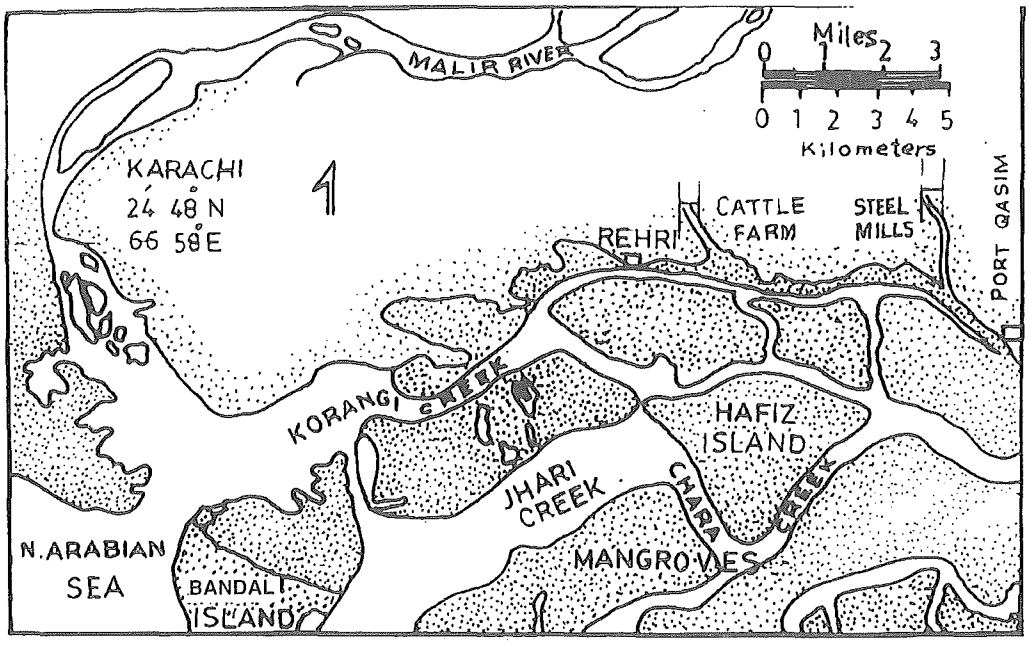

Fig. 1. Map showing the locations where *Phaeocystis* balls were observed.

and cell arrangement (Jahnke and Baumann, 1987; Rick and Alestsee, 1989). Higher temperature and salinity values (Table 1) recorded during the period of study also speaks in favour of *P. globosa*, as *P. pauchetii* is known to occur at low temperatures only (Jahnke and Baumann, 1987; Rick and Aletsee, 1989). However, Sournia (1988) recommended avoiding naming of species of *Phaecoystis* on the basis of studies on only one stage of life cycle. Other phytoplankton recorded alongwith *Phaeocystis* were *Asterionella* sp., *Ceratium* spp., *Coscinodiscus* spp., *Melosira* sp., *Navicula* sp., *Planktoniella sol* and *Synedra* sp.

It seems that *Phaeocystis* in Pakistan occurs exclusively in areas rich in organic matter, because it has not been reported elsewhere from the country. The detritus of mangroves, and sewage pollutants from the adjacent settlements, especially through the Malir river (Fig.1) are major sources of organic matter in the area (Rizvi &

Table 1. Water temperature and salinity values in the study sites.

Locality	Date	Temperature °C	Salinity ‰
Gharo Creek	91-09-30	30	41
Chara Creek	91-10-03	30	37
Off Rehri	91-10-08	28	38
Korangi Creek	91-10-14	25	39

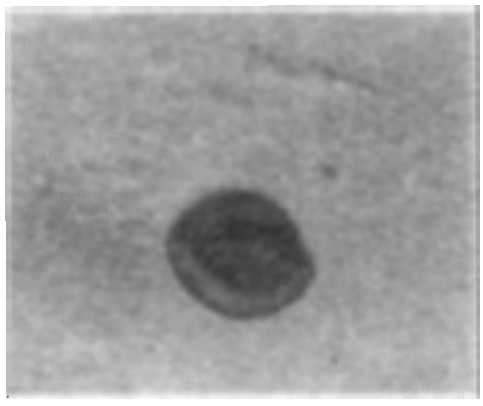

Fig.2. Shrunken ball of *Phaeocystis*.

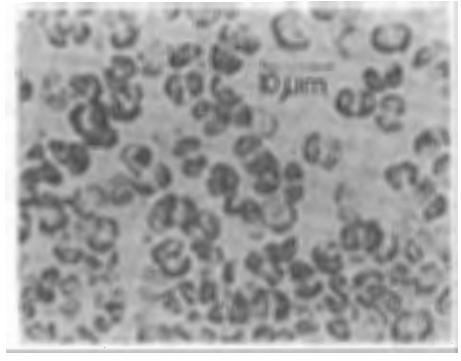

Fig.3. Cell arrangement in the palmelloid stage (x1000).

Qureshi, 1989). Pollution from a nearby steel mill (Rizvi *et al.* 1988) may also support growth of this organism as Kayser (1970) has already experimentally shown that (iron sulphate) favours its growth. Very recently Harrison *et al.* (1995) observed its occurrence in the same area but did not give its description.

REFERENCES

Al-Hassan, R.H., A.M. Ali and S.S. Radwan, 1990. Lipids and their constituent fatty acids of *Phaeocystis* sp. from the Arabian Gulf. *Marine Biology* 105(1): 9-14.

Atkinson, L.P., G.A. Paffenhofer and W.M. Dunstan. 1978. The chemical and biological effect of a Gulf stream instrusion of St. Augustine Florida. *Bulletin of Marine Sciences* 28(4): 677-679.

Drebes, G. 1974. Mariens Phytoplankton. *Eine Auswahl der Helgolander Planktonalgen.* (Diatomeen, Peridineen). Georg Thieme. Verlag Stuttgart. Pp.186.

Eberlein, K., M.T. Leal, K.D. Hammer, W. Hickel. 1985. Dissolved organic substances during *Phaeocystis* blooms in the German Bight. *Marine Biology* 89(3): 311-316.

Grimm, N. and T. Weisse, 1985. Temperature dependence of growth in *Phaeocystis pouchetii* (Haptophyceae) in batch culture. *Helgolander wiss Meeresunters* 39(2): 201-211.

Guillard, R.R.L. and J.A Hellebust, 1971. Growth and the production of extracellular substances by two strains of *Phaeocystis pouchetii* . *Journal of Phycology* 7: 330-338.

Harrison, P.J., S.C. Snedaker, S.I. Ahmad, F.Azam, 1994. Primary producers of the arid climate mangrove ecosystem of the Indus river delta, Pakistan: An overview. *Tropical Ecology* 35(2): 155-184.

Jahnke, J. 1989. The light and temperature dependence of growth rate and elemental composition of *Phaeocystis globosa* Scherffel and *P. pouchetii* (Hariot) Legerheim in batch cultures. *Netherlands Journal of Sea Research* 23: 15-21.

Jahnke, J. and M.E.M. Baumann, 1987. Differentiation between *Phaeocystis pouchetii* (Har.) Legerheim Scherffel and *Phaeocystis globosa* Scherffel. I: Colony shapes and temperature tolerances. *Hydrobiology Bulletin* 21(2): 141-147.

Kayser, H. 1970. Experimental-ecological investigations on *Phaeocystis pouchetii* (Haptophyceae) cultivation and waste water test. *Helgolander wissenschaftlische Meeresunters.* 20: 195-212.

Kornmann, P. 1955. Beobatchtungen an *Phaeocystis*-Kulturen. *Helgolander wissenschaftlische Merresunters* 5: 218-233.

Lancelot, C., G. Billen, A. Sournia, T. Weisse, F. Colijn, J.W. Veldhius, A. Davies and P. Wassman, 1987. *Phaeocystis* blooms and nutrient enrichment in the continental coast zones of the north sea. *Ambio* 16: 38-46.

Rick, H.J. and L. Aletsee, 1989. The distributionof the haptophytes *Phaeocystis pouchetii* (Hariot) Lagerheim and *Phaeocystis globosa* Scherffel in the north sea during May, June 1986 and February, March, 1987. *Meeresforschung* 32: 169-176.

Rizivi, S.N.H. and G.S. Qureshi, 1989. Present status of marine environment of Karachi- A review of existing data and literature and search. Technical report, Karachi coastal zone Management and Planning Project, K.D.A. National Institute of Oceanography, Pakistan. Pp.196.

Rizvi, S.N.H., M. Saleem and J. Baquar, 1988. Steel Mill Effluents: Influence on the Bakran Creek Environment. *In*: (Thompson, M. F. and N.M. Tirmizi, eds.) *Marine Sciences of the Arabian Sea.* Alnoor Enterprises, Karachi. Pp.549-569.

Saraceni, C. and D. Riggiu, 1974. Techniques for sampling water and Phytoplankton. *In*: (Vollenweider, R.A. ed.). A manual on methods for *Measuring Primary Productivity in Aquatic Environments.* 2nd Edition. IBP Handbook No. 12, Blackwell, Oxford.

Savago, R.E. 1930. The influence of *Phaeocystis* on the migrations of herring. *Fish Investigation London Series* 12(2): 5-14.

Snedaker, S.C. 1984. Mangrove. A summary of knowledge with emphasis on Pakistan. *In*: (Haq, B.U. and J.D. Milliman eds.), Marine Geology and Oceanography of Arabian Sea and coastal Pakistan. Van Nostrand Reinhold Company Inc. Pp.255-262.

Sournia, A. 1988. *Phaeocystis* (Prymnesiophyceae) how many species? *Nova Hedwigia* (47) 1,2: 211-217.

Veldhius, M.J.W., F. Colijn and L.H. Venekamp. 1986. The spring bloom of *Phaeocystis pouchetii* (Haptophyceae) in Dutch coastal waters. *Netherland Journal of Sea Research* 20 : 37-48.

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